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Precision SHOOTING

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COVER PHOTO

At the annual gallery rifle tournament in Modesto, Calif., Gary Anderson (right in photo), now studying in California, beat Modesto's Duane Jenner (left in photo) by a 795 to 791 score. Both shooters fired scores of 196 standing.

Later in January, at the Northern California Gallery Rifle Championship tournament at Willows, both Anderson and Jenner shot 795 aggregate scores, but Jenner shot 197 standing to Anderson's 195 to win the championship.

At Willows, Anderson shot a 200-14x score kneeling and then continued to fire for a possible new record. Shooting for four hours, with only short breaks between 20 shot strings, he scored 219 additional 10's to set a new Reserve category record for the kneeling position.

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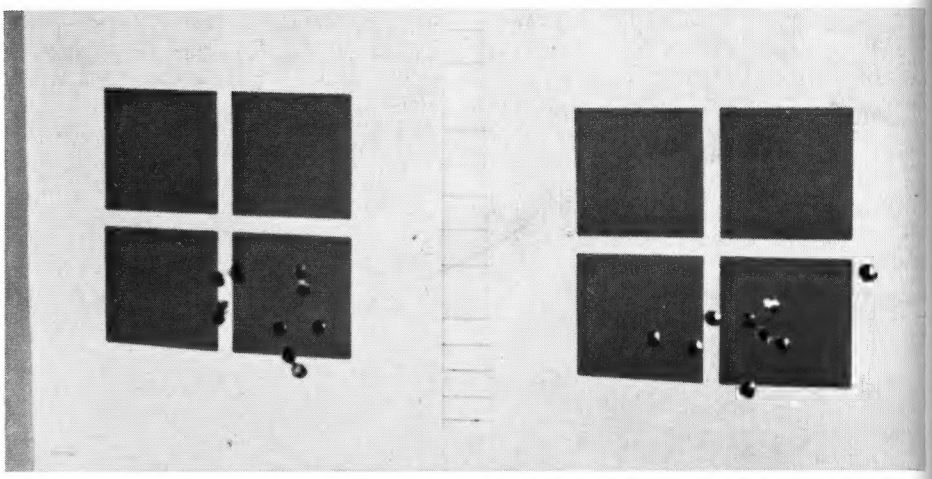
TRY IT YOURSELF

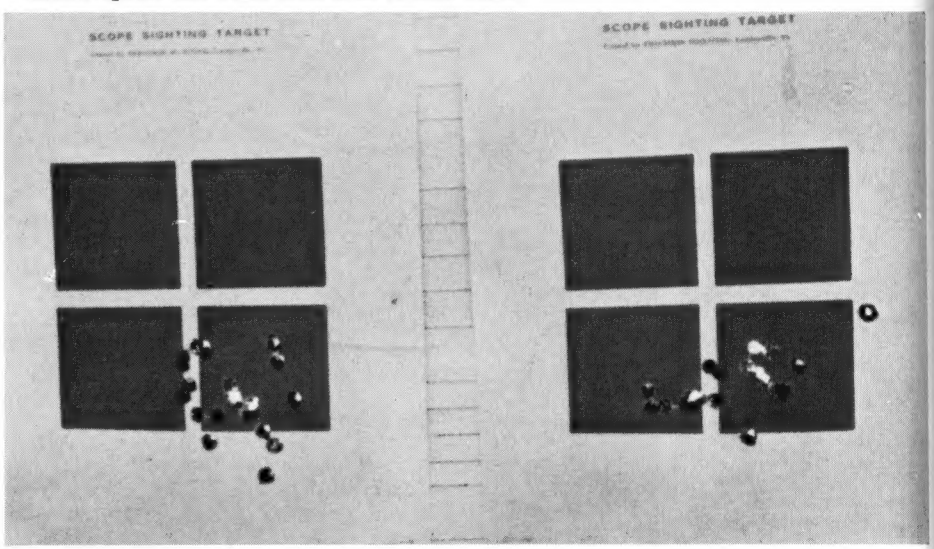
Most shooting editors recommend that hunter-riflemen make use of a rest for difficult field shots, when there is anything available to rest on or against and time to make use of it. Many of the editors have, and still do, warn against resting the rifle directly on or against any hard object. They recommend that the rifle forearm be held in the hand with the wrist or arm rested on or against whatever solid object is available. Some suggest putting a coat or jacket, or even a cap, on a log, rock or stump used for the rest and resting the rifle forearm on the improvised "cushion." The reason given for **NOT** resting any part of the rifle on or against a solid object is that the rifle will then "shoot away" from the point of rest, and the impression given is that this presumed deflection of the path of the bullet will be wide enough to miss substantial targets and thereby nullify the benefits of resting.

We wonder how many of these editors have tested out this theory of "shooting away from point of hard rest." NONE OF MY SPORTER RIFLES BEHAVE THAT WAY!

Several years ago I spent several hours testing this theory. I used a sporterized Krag and a Springfield 03A3 rifle, both with full charge hunting loads. I shot them from conventional bench rest position with forearm and butt rested on sand bags, with rifles supported by hands and shoulder with wrist or arm and elbows rested, with forearm rested on an unpadded wooden block, and even with the bare barrels ahead of the forearm rested directly on the wooden block. I also shot both rifles pressed tightly against both right and left sides of a solid post.



Targets after firing 5 shots from conventional sand bags plus 5 shots with rifles supported by hands and shoulder with left wrist and elbows rested. Target on left shot with Savage model 110, 308 Win. cal. and one on right with Springfield NRA Sporter 30-06 cal. The target is 5 inches square overall, with quarter squares 2⅜ inches square and white cross lines ½ inch wide.

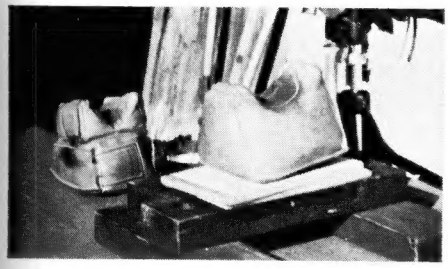


Targets after firing 10 more shots on them, in two 5 shot strings, with rifle forearms supported on a hard rest and butt on sand bag in conventional bench rest position.

I shot the series of shots from all these resting positions on one target for each of the rifles used. There was no significant change in center of impact throughout the series of the test. The shooting was at 100 yards range. A bit later I did some similar testing at 200 yards, with the same results as at 100 yards. This testing was reported in the June 1958 issue of PRECISION SHOOTING.

Rather recently reading a repeat of warning of rifles "shooting away" from point of contact with a hard rest I decided to do a recheck test. This I did on sunny, calm February 2nd with temperature between 35 and 40 degrees. (A ground hog could have seen its shadow that day had one ventured out, and might have enjoyed the bright, warm sun.) The shooting was done at 100 yards range.

I used two rifles; a Savage model 110 in 308 Win. caliber with barrel free-floated and topped with a Redfield 2X-7X variable scope on the 7X setting, with load of 45 grains 4895 and 150 grain home-made bullets; the other an old Springfield NRA Sporter in 30-06 caliber with barrel as originally bedded, topped with a Unertl 10X target scope, and load of 58 grains of 4831 and 172 grain home-made bullets (this load tends to give too wide horizontal dispersion but satisfactory verticals and needs further experimenting with charge weights). All shots from the Savage were fired on the left hand target in the illustrations, and all shots from the Springfield on the right hand target. Sighting on both rifles was lowered in order to keep a clear aiming point at the intersection of the white lines. Shooting was begun with clean, cold barrels and barrels were allowed to cool between 5-shot strings.



The sand bag rests used for firing five test shots with each rifle.

First, a 5-shot string was fired with each rifle from conventional bench rest position with forearm and butt rested on sand bags. The groups were normal in size and shape from each rifle.

Next, a 5-shot string was fired with each rifle with the rifle supported by hands and shoulder, left wrist rested on sand bag and elbows rested on bench top. First illustration photo was made after firing these two positions.

Next, two 5-shot strings with each rifle were fired with the forearm rested on a home-made hard rest (illustrated) and butt on sand bag, barrels allowed to cool between the two strings. The photo illustration records the results better than words could do it.

The twenty shots from four 5-shot strings did not make bragging groups, but the rifles are not bragging guns—just reliable, serviceable sporters.

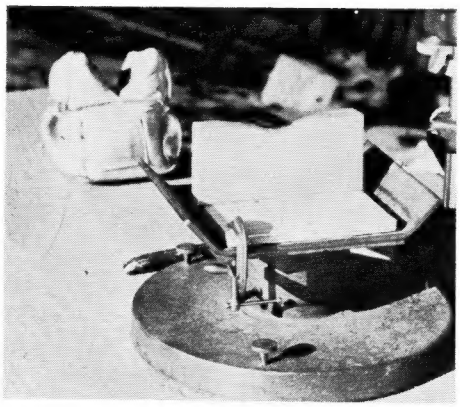
The rifles do move off the rests, both sand bag and hard, when fired. They move in the same direction and apparently with the same energy when the forearm is held loosely in the hand.

The little Savage reacted more violently from recoil than the Springfield, bouncing clear of the notch and coming to rest on the right side of the hard rest, and coming to rest high on the right ear of the sandbag used with enough energy to tip the bag out of position. This did not appear to affect the grouping ability of the rifle.

My observation ("opinion" if you prefer) is that if a rifle does move before the bullet emerges from the muzzle (and I think it must) the movement from a given rifle and load must be pretty uniform from shot to shot and is not greatly affected by the manner of resting or holding the rifle—if that also be uniform from shot to shot. My experience has been that some, but not all, rifles tend to give a slightly lower point of impact when fired from conventional prone position with tight sling than when fired from bench rest.

I do not claim that NO rifle will "shoot away" from its contact with a hard rest. I am only reporting my own experience with several of my rifles, plus some observations and "opinions." If you have any doubts of how your own rifles would behave, do some testing and ifnd your own answers. Don't take for granted the infallibility of any shooter-writer, especially this one.

P. H. T.



The home-made "hard" front rest used for firing the final ten shots. It is a piece of ⅞" board, on edge, with the edges of the notch rounded over to provide a constant contact area between rifle forearm and rest. The notch is merely a convenience in bringing the rifle back onto point of aim. The light model 110 Savage bounces completely out of the notch from recoil action.

With back to targets looking toward the firing point. The bench may be seen as a speck in front of the righthand end of the machine shed.

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(Agency News Release)

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TOURNAMENT CIRCUIT

BROOKLYN, NEW YORK

At the Metropolitan Rifle League's Club Team and Individual Match on January 16th the Lakeland, N. J. team beat the Roosevelt-W team of N. Y. C. by an eight X margin—1600-117x to 1600-109x. The course of fire was four-man teams firing 40 shots per member, prone with any sights at 100 yards indoors. Shooting for Lakeland were James Maher, Joseph Barnes, Arthur Battisto and H. Kinney, and for Roosevelt F. Briggs, L. Moore, Harry Stone and Sam Tekulsky. Sixteen teams competed in the match. The Roosevelt-B team was third with 1597-112x and Roosevelt-R fourth with 1596-119x. Madison, N. J. was fifth with 1594-112x.

P. Addea of Perth-Amboy, N. J. won the individual match with a 400-34. Six others had 400 scores, S. Tekulsky, W. Tomsen, J. Lantelme, L. Moore, D. Rosenblatt and R. Alvis ranking in that order.

Sam Tekulsky 800-61x, L. Moore 800-56x and R. Alvis 800-54x had the only possible aggregate scores, but P. Addeo with 799-66x had the highest X-count.

MODESTO, CALIFORNIA

On Jan. 8 and 9, 1966 The Modesto Rifle Club was host to 87 shooters on its annual January Gallery Rifle Tournament.

It was a beautiful day and like all gallery shooting it was nice inside too. Never before has there been such a display of silver trays, dishes, and plates to be given away as prizes. These were for all matches as well as the aggregate and team match.

The Modesto Club has found that the 2-man team or buddy match goes over very well, because it is sometimes very difficult to have 4 men to go to a match.

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Tournament Circuit

Gary Anderson took time off from his studies and made it to the tournament. Gary was in the lead going into standing, only one point down. In the standing match Gary and the local favorite, Duane Jenner, shot tie scores, 196, and Duane won after breaking the tie. Duane was down too many in kneeling and had to yield to Gary.

Winner—Gary Anderson	795
1st Master—Duane Jenner	791
2nd Master—Fergus Ward	789
3rd Master—Arlan Amaral	786
1st Expert—John Druce	768
2nd Expert—Don Peterson	767
3rd Expert—Ralph Weida	765
1st SS—John Hayes	757
2nd SS—James Goodnight	757
3rd SS—Bill Covington	752
1st Mk—Jim Beard	734
2nd Mk—John Demos	734
3rd Mk—Robert Smith	725

Winning Team (2-man) Fergus Ward 199, Carl Peterson 194=393.

WILLOWS, CALIFORNIA

This year 188 gallery competitors came to Willows from Northern and Central Calif. as well as Nevada and Oregon to compete in the 15th Annual Northern Calif. Gallery Championship, Willows, Calif. Jan. 22, 23, 29 and 30.

The first Saturday set the pace for the leaders as seven shooters reached the offhand stage of the 80 shot course two or less points down, James Tousey of Willows, Vic Zimin of Santa Rosa, Duane Jenner of Modesto, Fred Forster of Albany, Ken Cummins of Ukiah, and Gary Anderson, now of the Albany team. Duane Jenner fired 197 offhand pretty much the hard way to establish a 795 aggregate score that held up the rest of the contest as the Winner. Jenner fired an 8 his eleventh shot and a 9 on his seventeenth shot, keeping all the rest well in.

Gary Anderson also with a 795, but with a 195 offhand having reached the offhand stage without losing any points. With a 200 kneeling Anderson asked to be allowed to continue to fire for a national record. Being unable to return on any other day of the Championship Anderson elected to fire straight through until he missed a shot. Displaying his determination, ability and stamina he fired four hours straight with short breaks between 20 shot strings for 219 additional 10s setting a new Reserve Category Record for the kneeling position.

Unfortunately Anderson was firing from 7 PM to 11 PM Sat. night when there was a no host dinner set at one of the local restaurants. Most of the management and spectators, about 40 strong, did not show Anderson's determination and stamina and repaired to the restaurant for refreshments and dinner, keeping posted by telephone.

There were only two strong bids to challenge Duane Jenner's score the rest of the tournament. Jan. 23 Fergus Ward of San Francisco, last year's winner, came up with a 792. And on Sat., Jan. 29, Clifford Block of Reno, Nevada scored a 793.

Leading the Juniors with a very respectable score was Tom Whitaker of Belmont with 790.

Nadine Gillum of Chico, Calif. led the ladies with 773.

Every shooter was presented with a small bag of rice as a souvenir of the Willows Rifle Club and that rice growing area. Awarded by drawing were hams, cheese, beverages and coffee. Awards for the event consisted of medals, merchandise, and engraved silver.

No Gallery Championship in Willows is complete without some rain and the weather man did not let down this year. Three days were pretty Chamber of Commerce weather but the fourth one was a downpour. With a corrugated iron roof there is considerable noise during a heavy rain.

The University of California Rifle Club came along strong in the team Championship, three members firing the first day and the fourth on the last day. This type of a split always brings conjecture as to what has to be shot to win and what are the chances the competitor will blow it. Firing first were:

Chas. Quesnoy—197, Arlen Amarah—199, Tom Kilfoil—197

Firing last was a determined junior with 197 also, Tom Whitaker. Team score 790.

The breakdown in classes this year finds the largest Master Class entry yet, with a total of 79. The Masters in the lower part of the Class are finding it hard to climb to the winner's bracket. There was some talk of a split or reshuffle in the Master Class. It seems to be a long way from 760 to 795.

The Expert Class listed 50, the Sharpshooter Class 34 and Marksman Class 25.

The Pacific Rifles of San Francisco arrived with the largest group of shooters from one club, a total of 24 not counting the gentleman (?) who lists the teams, Dick O'Brien.

The Medford Rifle Club of Medford, Oregon probably came the farthest to shoot, although it is no short distance to Reno, Nevada and Los Gatos, Calif.

There were six Masters and one Expert shooting 20 center shots in the prone position, all receiving special 20X embroidered brassards from the Willows Rifle Club; Tom Whitaker, Lew Conger, Howard Forster, Arlen Amaral, Duane Jenner, Lloyd Fischer and John Moeller.

In Match 2, 20 shots sitting, Irvin Brown of Ukiah, Calif. fired 200 with all center shots to receive one of the 20X sitting brassards as well as the first place award.

Chas Quesnoy led the kneeling match with 200 with 15 center shots.

Duane Jenner was out in front of everyone with a 197 in the standing position.

THE FIFTY SHOT CHAMPIONSHIP

The Metropolitan Rifle League's 50 Shot Championship, which has been fired annually in February for many, many years, was fired on the II Corps Armory range in Brooklyn, New York, February 13th. The course of fire is 50 shots prone with scope sighted small bore rifles at 100 yards indoors.

Eleven of the seventy-one competitors fired possible 500 scores. Larry Moore was the winner with a 500-46x score, which tied the match record on the reduced target. (The other co-holders of the record are Rans Triggs and Abe Rosenblatt.) Following Moore were; E. Clausen 43x, F. Boyd 42x, R. Truesdell 42x, J. Holle 41x, P. Murray 40x, S. Tekulsky 39x, R. Walton 36x, C. Walter 36x, M. Creta 30x and W. Ritchie 29x. High Lady was Ellen Glaab in 32nd place with score of 498-29x.

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Random Shots

By Betty Summerall Duncan

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Winds uninhibited and temperatures around the thirty mark were offset by the warm hospitality of the Floridians during the first three days of the **13th Annual Sawgrass Championships** and the **Preliminary Tryouts for the World Shooting Championships.** On February 6th, the superb shooting weather about which Elihu Lyman has been writing home finally materialized on Miami's Trail Glades Range . . . competitors thawed out . . . and the Palmetto Rifle Club's annual classic was declared the most successful yet.

Fifteen men and a lady shot through the wind (or waited it out) to establish eligibility for the final tryouts at Lackland Air Force Base, Texas, June 4-18. Minimum qualifying score was 1080. Only eight exceeded 1100.

CAPTAIN LONES W. WIGGER, JR., understood that it was "winner take all," which he did—both the International and Prone Grand Aggregates. Lest you underestimate the formidability of the other 64 position shooters and 120 entered in the Sawgrass (Prone) Championship, it is that caliber of competition which brings out the best in one . . . Lones is not one to be cocky. He has an abundance of self-confidence, certainly, but always figures that he will have to work for everything he wins.

They did not let him steal this pair by any means. In fact, Wigger was trailing by 10 points going into the Standing, with LT. Donald Adams, W/O David Boyd, USMC, and LT. Dennis Dingman outclassing him. . . The Sawgrass Prone Championship was won on X's, as Wigger coasted in ahead of Sgt. **Michael H. Allen**, USMCR, of Beverly Hills, Calif., 3187-228X to 3187-200X.

In the **prone** phase of the Int'l Course, Adams and David Ross, USA MTU, led with 394's. Eric Sundstrom scored 393 . . . **Kneeling,** Dingman and Adams were high

Captain Lones W. Wigger, Jr. **Photo by Carl Knight**

with a pair of 380's. Boyd and Jim Meger followed with 376 . . . With two down and the Standing match to go, Don Adams' 774 placed him comfortably ahead of Boyd's 768, Dingman's 767, Wigger's 764, and Bill Krilling's 763—that is, for a little while.

Imagine yourself in Wigger's situation. Consider what your mental attitude would be . . . how you would approach the Standing . . . The shooter in the next booth was attempting to dope the wind and shoot in the lulls. His first shot for record was a 2, for an encouraging beginning. Glancing over at Wig's target, he was still on his sighter. And, what a sighter it was—a center group about the size of a quarter. He was proceeding cautiously, deliberately—with that quality which was also observed in Tokyo . . . The competitor "next-door" fired again. This time it took courage to look—it was a 1. How was Wig doing? He was shooting in the wind!!! Maybe that was the way to do it. Those lulls looked sneaky anyway.

The end result was a **369—not** intended to give aid and comfort to the enemy. The "will to win" demonstrated by Wigger in frigid, lashing head-winds, is an example of the American brand of sportsmanship at its best.

Dingman turned in a 363, Krilling a 358, and Meger, 352, for high Standing scores.

Preliminary Tryout Aggregate

Wigger	1133
Dingman	1130
Krilling	1121
Boyd	1115
Adams	1111
John Foster	1108
Meger	1108
Margaret Thompson	1107

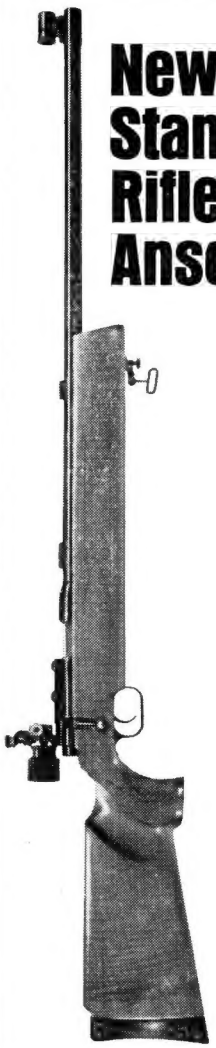
All are from the U. S. Army Marksmanship Training Unit with the exception of Boyd, who is attached to WTB MTU MCS, Quantico, Virginia.

Others qualifying for the final tryouts: Dave Kimes, Martin Gunnarsson, L. Sampson, Don Harmon, Ross, all of USA MTU; Frank Briggs, Marine reservist; Tommy Pool, USA MTU, and Eric Sundstrom, a student at The Citadel, Charleston, S. C.

Standing usually tells the story and in

Please turn to page 16

New I.S.U. Standard Rifle from Anschutz



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Savage ANSCHUTZ

GUNS AND YOUR EARS

By J. N. Byrd, M.D.

(Editor's note: This article was first printed in Precision Shooting Vol 1, No. 1, May 1956. Since that time devices to subdue the noise from shooting have become readily available, but too many shooters still do not make use of them. As one with an increasingly severe hearing loss, caused chiefly from shooting, I believe reprinting this article at this time is worthwhile.)

. . . . . .

The human being instinctively avoids noise whenever he can. In infancy one of the few things he was afraid of was a sudden loud noise and he keeps this fear to a more moderate degree for the rest of his life.

If guns made less noise many more people would enjoy them as do the many gunbugs about the world. Certainly in many cases the choice of a gun for a specific job is determined by the amount of noise it makes when fired. We might add that the choice of a gun for a specific person often depends on this noise factor. A heavy report causes flinching in most people and this certainly detracts from their effective use of the gun. Give the inexperienced shooter a combination of heavy recoil and ear splitting report and you may find he has taken up tennis as a hobby instead of shooting.

Those who train others in the use of firearms know that it is far better to start the beginner on the lighter calibers and then work up to the heavier ones. A person never conquers a fear all at once. He does it by degrees. And so the shooter can conquer his dislike for gun noise by degrees.

The shooter, as he progresses, gains skill in his hold, trigger squeeze, wind and mirage judgment, etc., but although he may subdue his fear of the noise of firing, he can never obliterate the effects the noise may have on his ears and nervous system.

The experienced rifleman, handgun or shotgun shooter has learned something else during his training. He knows that if he shuts out most of the sound of firing around him he helps his chance of winning. He has found that it very substantially helps his concentration on proper hold and trigger squeeze. And he is also much less tired at the end of a match. In most cases the shooter does not stop to find out why he does better shooting with plugs in his ears. So let us look this problem of gun noise over and see how this may come about and also what may happen if no effort is made to keep gun reports from repeatedly jarring the hearing mechanisms which are so valuable and irreplacable.

It is a well known fact that overstimulation of any organ of the body will ultimately result in damage of more or less permanent degree to that organ if the overstimulation occurs often and severely enough. This fact holds particularly true in the case of the human ear. Let us present a short review of the workings of the ear and in so doing perhaps show why the shooter should shut out as many gun reports as he can. The sound of the gun being fired enters the ear in the form of sound waves which are a series of vibratory motions of the air. These vibrations transmit some of their energy to the ear drum and cause it to vibrate also. Stretching from the inner surface of the drum, in the space called the middle ear, are a series of three small bones called ossicles. These small bones are attached to one another in such a manner as to form a chain across which sound is carried from the drum to the internal ear where the true sound receptor is located. This organ is called the cochlea and is shaped like a spiral staircase having approximately 2¼ turns. Actually it is as a spiral tube with two ends. One of these ends is blocked by the innermost of the three ossicles. The other end is closed by a membrane. Within this spiral tube is a fluid which surrounds a great many tiny cells which have hairlike appendages. These cells communicate with the auditory nerve which transmits sound impulses to the brain for interpretation. So then the mechanism of hearing consists of the following steps: The vibration of the drum caused by sound striking it is transmitted to the ossicles; the innermost of the ossicles is attached to one end of the cochlea and the vibrations will set into motion the fluid within the cochlea; the motion of the fluid will cause the hair cells to move thus sending impulses along the auditory or hearing nerve which goes to the hearing center of the brain. This is, in essence, the manner in which sound is heard and interpreted. There is definitely a case of the use of ear plugs while firing guns. Repeated exposure of the ears to the intense sounds produced by modern firearms can produce partial deafness of a specific type and usually within the frequency range of the sounds produced by the guns themselves. The reason for this is that the cochlea has specific areas in its convolutions where sounds of like specificity are picked up. In other words each sound may have its "place" in the cochlea. But the insidious thing about it is that prolonged over-stimulation of the hair cells in a particular area of the cochlea will result in degenerative changes in these cells with permanent alteration in their ability to function properly. So it follows that sounds from other origins may be as poorly interpreted as the sounds which caused the damage in the first place. Then too, it must be added that all guns do not give forth the same sounds and that a shooter who uses a number of different guns without ear protection may cause damage over a fairly wide area of his hearing apparatus.

While it is true that most firearms make quite a loud noise when fired it is not just how loud the guns may be that cause ear damage but how intense the sounds are that strike the ear. There is a definite difference in the intensity and loudness of the sound. Intensity denotes a purely physical value whereas loudness refers only to the auditory sensation. So then intensity refers to the power of the sound and may be independent of the auditory sensation. Some very intense sounds can be produced which cannot be heard by the human ear. Experimenters are busy these days producing improved cartridges. Generally speaking these improvements include marked increases in velocity. To get more velocity it is usually necessary to add more powder to the case. This addition will raise the pressure within the gun and this pressure transmits itself to the outside and produces sound of high intensity by very powerful disruption of the air. Those shooters who use some of the large capacity standard and wildcat cartridges can attest to this. Most of these rifles have such intense reports that the ear is unable to cope with the sound and a deafening effect is noted. These are the guns which can produce the most damage to the unprotected ear. The intensity of some of these rifles may be sufficient to cause other sensory phenomena such as literally feeling the blast, sometimes in the teeth.

There are other effects produced by the auditory reception of repeated loud and intense sounds. One of the most outstanding of these is fatigue. Most shooters who engage in competitive shooting experience fatigue which is out of proportion to the amount of physical work done while shooting. This fatigue is due to an involuntary increase in energy expenditure caused by the noise itself. It follows of course that the fatigue has a markedly detrimental effect on accuracy of thought and manual dexterity. It has been demonstrated many times that noise may reduce the efficiency of factory workers from 50 to 60%. Naturally these findings would apply to the shooter in competition. His efficiency is similarly reduced by the sounds of the guns on either side of him. It has also been shown that noise increases the oxygen consumption for a given piece of work from 20 to 25%. This too has a depleting effect and produces or increases fatigue.

It is not the purpose of this article to cause any unrest in the minds of shooters. The foregoing remarks are simply meant to emphasize the need for ear protection during certain types of shooting. Certainly this is not to say that the hunter who fires only occasional shots should plug his ears before using his gun. Nor do we advocate the use of ear plugs for those who may go out for an afternoon of plinking with a .22. But those who engage in frequent and prolonged center fire matches, testing or practice sessions should by all means protect their ears with plugs.

At this point the question may arise as to the proper type of plugs to use in the ears. The author has seen shooters use everything from empty cases and pencil erasers to complicated mechanical devices in their ears. An old and fairly reliable standby is cotton although something more dense is usually more effective. The effect desired is one which will dampen the sound waves coming from the fired gun. There are well designed ear plugs on the market these days and the shooter will have no trouble securing protection if he so desires.

(Editor's note: This article was written before the present day muff-type ear protectors were readily available.)

In conclusion let us say that there are many points in favor of ear protection while shooting. The shooter who does this gains points on his score and retains to its full capacity one of the most valuable contacts with the world around him.

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THE HALF-SCOPE FOR SUBSTANDARD TARGETS

By Jesse M. Grigg

For quite a number of years shooter interest and degree of participation in outdoor smallbore prone has been progressively declining. One reason is that the courses are too difficult for the conditions under which they are fired. Another, the result of the first-named cause, is that many shooters are discovering easier, and possibly less costly, ways of participation in small-arms competition.

In the face of this obvious trend one might expect that something would have been done to eliminate or at least moderate the causes of decline. Yet at a time when this branch is in sore need of stimulation, the reverse is true, and things are being done which tend to further discourage the smallbore shooter. One of these has been strict enforcement of the three-pound trigger rule. Another that in my opinion is far more harmful is the tinkering with the targets that we have to fire on.

Common horse sense dictates that the rings in the white should be faint for metallic sight shooting, and the rings in the black aiming bull should be coarse for scope shooting. Indeed, for many, many years, excepting that the aiming black was and still is too small for efficient iron sight aiming, this was the kind of targets that we fired on. But what are we getting now as the old stocks run out? One is a 50 yard target with very coarsely printed rings in the white, and very faintly printed rings in the black, a target that is not suitable for either iron or scope. The white band appears gray in metallic sight shooting, and the faint rings in the black are too faint for good scope shooting.

This year another variation has confronted us in one or more of the matches at every tournament, and at Camp Perry confronted us in all the prone matches. Moreover, the block lettering and numbering in the sighter black was so coarse that in its vicinity a bullet hole was difficult if not impossible to identify. Thus, though the faint rings in the white did no harm in iron sight aiming, to me at least the faint rings in the black were of very little help in aiming with the scope. In fact I could not always make them out satisfactorily even with my big spotting scope. So in an any sight match I was compelled either to shoot with iron else quarter the bull if I put the scope on. Consequently I fired many of my any sight matches on the faint-ring targets with iron this summer.

As measured by me, the printed ring widths on the new targets presently in circulation are given in what follows. One target is the 50 yard, put out by Amer. Target Co., Denver. In the black the width is .016" as compared with .03125" on what formerly was the standard target. In the white the ring widths are .052", .056", and .058", these being about twice the widths on the old targets. Thus the three-minute white band in aiming contains about one part black to 12 parts white, whereas on the old target there was about one part black to 24 parts white. Obviously the shooter is severely penalized whichever sights he uses.

The 50 yard targets being currently distributed by Natl. Target Co., Wash., D. C., has rings that are scarcely 1/64" wide in both black and white as compared with 1/32" on the old targets. Such faint rings are suitable for iron sight shooting, but for scope I am compelled to just quarter the bull, even in the absence of mirage.

On the corresponding 100 yard targets put out by this company the rings in both black and white are almost 1/32" wide. On the old targets the rings in the white were 1/32", and in the black were 1/16". Thus for scope the old rings were twice as wide as are the present rings, notwithstanding that even the old rings on days of bad mirage were too small to see, and quartering the bull was the only recourse. Because of this tinkering with the targets smallbore competition, instead of being a test of ability to hold and squeeze, has become a test of eyesight, a matter that might be settled with an optometrist's chart instead of a scoring gauge.

As complaining on my part has brought no return to common sense, lately I have been trying to devise some way to overcome the handicap which the change has imposed on scope shooting. In one experiment I aimed a 6x gallery scope as at (a) in Fig. 1. In another I aimed the same way with my regular rifle scope. In neither experiment did there seem to be any gain over just quartering the bull. Next I tried aiming with the crosshair junction at 3 o'clock as at (b) in Fig. 1. Groups were very narrow in the horizontal direction, but too wide in the other direction. So, having no choice other than use of the iron sight principle, Iconcluded that I might as well go as far as the law allows with it in the any sight matches.

This decision brought to mind an article which appeared in the Feb. 1939 RIFLEMAN under the title "Half-scope Sights," by F. C. Ness. A half-scope is only an iron sight system which includes a weak convex lens at the front sight to slightly magnify the bull, plus a front sight aperture which is large enough to ring the magnified bull.

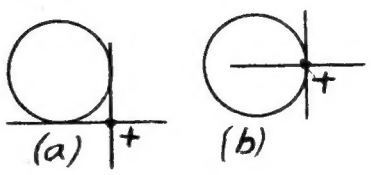


FIG. 1

For two reasons the permissible degree of magnification is small. One is that the degree of blackness diminishes directly as the lens power is increased. The other is that the eye is able to concentrate attention at only one place at a time. In fact it cannot accurately appraise the sight picture if the appearance of the bull, real or apparent, is only a little larger than the usual 50 foot indoor bull, whose aiming black is 8.66 inch-minutes.

In "What Size Aiming Bull?", Feb. '63 PRECISION SHOOTING, was stated that the diameter of the most favorable aiming black is not over 12 or possibly not over 11 inch-minutes, this depending somewhat on the individual shooter. Thus the 8.66 minute bull of the 50 foot indoor target is near enough to the most favorable size to permit very efficient aiming. Accordingly, if the half-scope be designed so that the present outdoor bulls seem to have an apparent aiming black not less than that of the indoor bull the advantage will be a gain in the ratio 1.6 to 1 which relatively is enormous, considering that the present outdoor blacks are just too small for efficient aiming with metallic sights.

The aiming blacks of the present 50 and 100 yard outdoor bulls are respectively 5.75 and 6 inch-minutes. Spectacle lens that may be used for magnification of them with a half-scope usually are supplied in diopter sizes that are multiples of ⅛. Placed at ordinary front sight distance a ¼ diopter lens magnifies the bull about 1½ times, thus giving apparent sizes which are 8.625 and 9 inch-minutes respectively for the 50 and 100 yard outdoor targets. With use of this lens the magnified bulls appear very little different in size from that of the unmagnified 50 foot indoor bull, and offer very nearly the same advantages in aiming.

On the other hand if one chooses a ⅜ diopter lens the apparent outdoor aiming bull sizes would be respectively 12.9 and 13.5 inch-minutes. However, having experimented with both the ¼ and ⅜ diopter lenses, I much prefer the smaller size for shooting. The smaller shows a magnified bull that is large enough to see without undue strain, while the ⅜ diopter lens introduces serious difficulties of other kinds if existing iron-sight equipment is retained. With this magnification in such a small field only one bull at a time is seen, with result that too much time is lost, first just trying to find a bull, and afterward trying to get on the right one. Owing to this difficulty and fact that movement of the muz-

Turn page please

zle moves the aperture only half as far as the sense of sight indicates, crossfiring is difficult to avoid. So I chose the ¼ diopter lens.

A semi-scope for the front sight is such a simple thing that a working model may be rigged up in various ways, depending on the ingenuity and mechanical ability of the shooter. A lathe will do a better looking job, but soft solder and ability to use it will enable contraptions of various sorts to be put together. In principle it is required only that the lens be securely fixed so that the sight line passes through both the aperture and the lens, with the lens optical center in or at least very nearly in the sight line. As the magnification depends on distance of the lens from the eye, the lens should be at not less than front sight distance. Also it must be secured so that it cannot move; otherwise the zero might slightly change. The requirement that the optic center be in or nearly in the sight line is due to fact that a jog in the sight line might call for different rear sight dimensions, or a modification of the cheek piece.

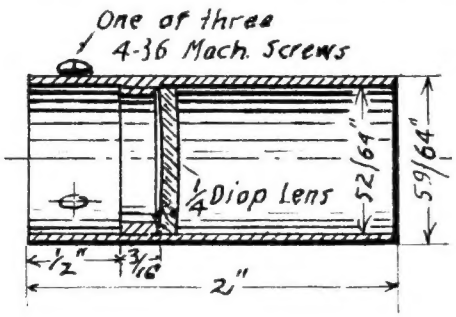


FIG. 2

In Fig. 2 is shown a design that may be easily constructed. For the tube may be used a short length of ¾" thinwall wiring conduit (iron) which needs to be enlarged only a trifle to slide over a Redfield Olympic sight tube that measures about 51/64" outside diameter. The iron conduit wall is thick enough to permit drilling and tapping for 4-36 machine screws. A scrap length of this conduit perhaps may be found around a building construction job or else may be obtained at an electrical contractor's shop.

The internal sleeve which serves as stop for the lens is made with a section of the same tubing by cutting and shortening it circumferentially until it enters. Fixing it in place may be done by riveting, or if the stock is of iron it may be secured with ordinary soft solder. The quarter-diopter lens may be secured in place with Duco cement. Afterward, if ever the need arises, the lens may be loosened mechanically by cutting the cement with a knife, or chemically by dissolving it with a few drops of acetone.

One way to obtain a suitable ¼ diopter convex lens already cut to size is to purchase it through an optometrist. But be sure to insist on having its optic center in the center of the lens.

A cheaper way, if you have the necessary equipment, is to buy an uncut spectacle lens from an optician and cut it to size yourself. With the uncut specimen it is necessary first of all to locate the optic center with tolerable accuracy. To proceed with this hold the lens at arm's length and sight through it ot a straight edge such as a door jamb. Then by slightly moving the lens find the place where the straight edge inside the lens coincides with the straight edge outside. Then with the other hand and a pen put an ink spot at top and bottom to mark the two places of coincidence, and thereafter carefully join the two dots with an inked straight line.

Now rotate the lens through an estimated right angle and in similar fashion obtain another straight line. Where the two lines intersect is the optic center, namely the place at which a sight line will pass through the lens without divergence.

In preparation for grinding cover both sides of the lens with transparent Scotch tape. Through the transparency the optic center dot will be plainly visible; and if, as it should be, the tape is left on until all grinding and cutting are completed, the tape will prevent marring of surfaces that otherwise would be ruined by emery and glass dust.

With a hand grinder and the expenditure of one or two of the ¾" thin emery wheels such as dentists use you can quickly rough the lens to approximate size. With the thin wheel first cut four straight gashes to leave the lens square after the segments have fallen or broken off, then cut off the four corners to leave an octagon. After this the octagon may be readily rounded on an ordinary emery wheel, then rinsed in water to wash away the glass and emery dust, after which the tape may be removed.

Cut to ¾" diameter the lens will be a trifle loose in the tube, but the clearance space leaves room for a drop of cement here and there. As Duco cement is waterproof and holds well, it is not necessary to apply it clear around the circumference of the lens.

In use the lens magnifies the bull but not the aperture insert. Thus as a ¼ diopter lens shows an apparent aiming black which is .4 minute smaller than that of the 50 foot indoor bull, the suitable aperture diameter should subtend an angle which is less by about .4 minute, or be smaller by about .004", this depending somewhat on the individual and the kind of insert. For 50 yards and 100 yards and 50 meters there seems to be very little difference in choice between use of a #29 drill or a #28 whose diameters are respectively .136" and .1405".

Finally, it hardly needs be stated that the half-scope is legal only in the any-sight matches. Accordingly, in the interest of good sportsmanship, it might be well to acquaint your friends with what you have so that they may know at a glance that you are not cheating.

FLASH HOLES AND CARTRIDGE CASES

By Fred W. Hallberg

During bull-sessions behind the ready-line, shooters have often asked "what affect does an off-center flash hole have on the ballistics of a cartridge?" The answer is none as far as the original factory issued cartridge is concerned. Such an off-center flash hole will, however, create so many problems if and when the case is reused that I cannot believe Ordnance was wise in relaxing specifications regarding that point. Of course, what I write here is only one man's opinion. Perhaps someone else will have more to say regarding this subject.

Handloaders can get around an off-center flash hole by knocking out the fired primer with a hardened punch. This is necessary so that the operator can feel for the hole. The primer extractor pin in the resizing die is then removed so that the case can be properly resized. An excellent set of hand punch tools can be obtained at little cost from L. E. Wilson, at Cashmere, Washington.

If you do not remove the punch from your sizing die or if you try to deprime in quantity as in a factory operation, one of three things can happen; 1) you will punch a second flash hole, 2) you will enlarge the hole already there, 3) you will bend or break the extractor pin and seriously damage the case. Whenever this happens the case should be thrown away, because the broken or bent pin can do more damage than just enlarging the original hole.

Consider the effect of an off-center flash hole on factory production involving reuse of fired cases. In Europe, especially in Scandinavia, it has long been common practice to return fired cases to the factory to be reloaded and re-issued. This is done despite the fact that their cases are primed with Berdan primers. My guess is that such fired primers are all picked out by hand, probably by a line of girls sitting at a factory table. Some time between World War II and Korea, the Norwegians tried to overcome this problem by centering a large flash hole through the Berdan anvil (which is part of the case web) and then forming a small horizontal groove across the top of the anvil so that the flash could find its way through to the center hole. This was quite a radical departure from the standard Berdan System of two or more small holes near the base of the primer cup. Some ten or fifteen years ago I donated a few such Norwegian cartridge cases to the NRA collection and I presume they are now on display. At that time I also suggested to Ordnance that some thought be given to such a system as a means of reducing primer manufacturing costs but I never heard anything more about it.

Why did the Norwegians do this? The only reason I can think of is that a center hole would facilitate their reloading processes.

Fred W. Hallberg

In this country it is almost a tradition that we should be careless of our resources and so it probably never occurred to anyone that fired cases that are easily retrieved in quantity might one day be reused. Such reuse is becoming more and more common and you can now find stocked in many sporting goods stores factory loaded sporting ammunition based on reused cases. Ordnance, too, during Korea, reused cases that had been fired in ballistic tests but such reuse was limited to blank cartridges. This was a beginning that could, and I think should, be considerably extended. There appears to be no valid reason why cases once used and in good condition should not be reworked and reissued with ball bullets for practice and training purposes.

But accurate ammunition requires uniform flash holes. Irregular sized holes create irregular ignition and irregular ignition creates irregular pressures. I cannot now prove it, but I have a hunch that problems at one time experienced by Ordnance with blank cartridges loaded in reused cases was to some extent due to irregular flash holes. In that particular situation there was no question but that the nature of the powder was the real villain in the woodpile but I do believe that irregular sized flash holes contributed considerably to the difficulty.

Brass is the ideal metal for a cartridge case. The basic purpose of a case is to act as an obturating cup and to seal in the gases so that they will move out at the muzzle instead of back through the breech. And as a bonus, after pressure is released, the brass contracts sufficiently to facilitate extraction. This is why the sides of a brass case can be quite parallel without hindering release. But brass is expensive and we throw tons of it away. During World War II so much cartridge brass was left behind on various islands in the Pacific that the Orient was supplied for years with the metal which some tourists brought back to this country in the shape of little Buddas and other brass trinkets. Cartridge brass is roughly 70% copper and 30% zinc. Copper today retails at about sixty cents a pound and three are surprisingly few cartridge cases in a pound, particularly when large cases are involved.

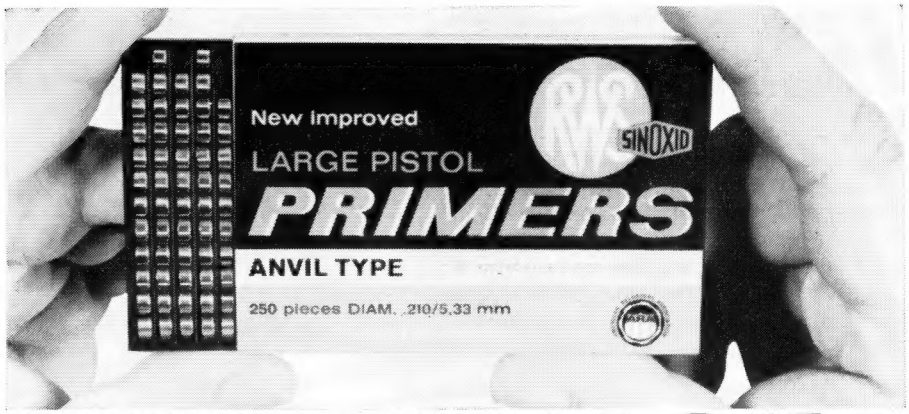
All this brings up the question as to why some other material such as steel should not be substituted for brass. The real trouble is that we have never really designed a steel case. We have always used steel as a come lately substitute for cases that were especially designed for brass. This worked after a fashion but not nearly as well as it would have worked had the cases been originally designed with steel in mind. Brass cases can easily be substituted for steel but steel cases cannot easily be substituted for brass.

Steel readily performs as an obturating cup but it does not readily "reshrink" to facilitate extraction. Other problems also are involved but this is an important one. Manufacturing processes are more expensive than for brass but I believe that the differential in cost can be reduced considerably. The main requirement is to create a design for steel in the first place.

Shape requirements for steel involves body taper and neck length. To function properly, steel must have greater body taper. It must also have the shortest possible neck length compatable with necessary holding strength for the bullet. Once these two features are incorporated into design, you have already eliminated one half of your troubles. Corrosion has been an important problem but with today's technology it does not appear too difficult to solve.

Steel cases can be readily reloaded provided they are properly cleaned before resizing and provided your dies are properly hardened. But real good dies are not easy to come by. Perhaps I can discuss that problem in a following article.

Recently, more than 2,000 landowners have switched from agriculture and livestock pursiuts to recreational enterprises—including development of hunting and shooting facilities. More than 9,000 other landowners have expressed to the U. S. Department of Agriculture their intention to do likewise.



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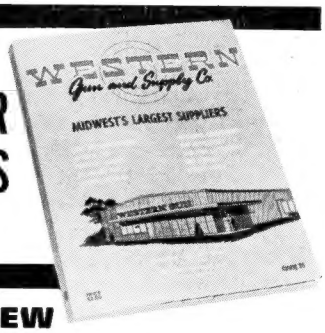

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National Bench Rest Shooters Association, Inc.

PRESIDENT'S CORNER

Your officers and directors are now in the process of obtaining full information on the proposed National Matches. The Gulf Coast region has recommended September 3, 4, 5, as the time and Midland, Texas as the location of the Varmint Nationals. The Eastern Region has proposed August 2, 3, 4, 5, as the dates and the Reed's Run Range at Augusta, Ohio as the place for the Open Bench Rifle Championships. As soon as the respective clubs forward full information previously requested of their respective Directors, as to facilities, match program, etc., the board will take action for final approval.

It is with deep regret, that I must accept the resignation of L. F. Carden of Kansas City as our Vice-President. The Board of Directors will act on this vacancy at once.

"Bud," as all of us have affectionately known him, has assured me of his full and continued support of N. B. R. S. A., Inc. and our activities. "Bud" always represented his region and views with deep conviction and ability. Once the decision was made, he carried out the program. His was one of the strong and willing hands that turned out the present rulebook. For the membership and personally let me thank you "Bud" for past effort and future participation.

The Eastern Region by appropriating additional funds to N. B. R. S. A., Inc. makes it possible for us to take a small ad in the American Rifleman. We're doing something about our membership drive. This should get that "wailing" President of yours off the path to that psychiatrist we spoke of last month.

Brunon V. Boroszewski

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THE SNOW BALL LEAGUE

The first bench rest match of the Snow Ball League schedule, at Millerton, N. Y. (Jan. 23rd) was snowed out but we will have a make-up shoot later in the season.

Considering that, weather-wise, February 13th was a very unlikely day to hold a bench rest match, we were quite successful. Twenty shooters went to the line but Doug Hall's group of .275" at 100 yards was the only merit award winner of the day. The 100 yard aggregate captured by A. Cornell (.513) using an SS&D built .222, and the 200 yard aggregate went to J. Bugiada's .639 MOA.

High for the Grand aggregate were F. Tirrell, A. Quirico, R. Tonnesen, M. Hollister and A. Zisz. For score; M. Hollister, Ed Shilen, J. Richmond, F. Tirrell and R. Tonnesen.

Mrs. John Dewey served delicious food in the club house and despite the wind and rain, a fine time was had by all.

Art Cornell

A CORRECTION

In the NBRSA World Records, NBRSA, listed in the February 1966 issue of Precision Shooting, the Heavy Varmint Rifle aggregate for five 5-shot matches at 100 yards is incorrectly listed as .3189 M. O. A. The correct record is .2189 M. O. A.

The Precision Shooting editor apologizes for making this error. Please correct this error on your list.

1966 Bench Rest Matches

Eastern Region

Augusta, Ohio: April 16-17, Heavy Varmint. July 16-17, Bench Rest Rifle and Heavy Varmint. Aug. 2-3-4-5, Bench Rest Rifle NATIONAL CHAMPIONSHIP. Reed's Run Rifle Range, Box 66, Augusta, Ohio. 44607.
Staunton, Virginia: Apr. 30 and May 1, Bench Rest Rifle and Heavy Varmint. Stonewall Rifle & Pistol Club, 409 DuPont Ave., P. O. Box 441, Staunton, Virginia 24401.
Easton, Ohio: May 14-15, Bench Rest Rifle and Heavy Varmint. Aug. 20-21, Bench Rest Rifle and Heavy Varmint. Chippewa Rifle Club, S. A. Buchtel, Sec'y, 2245-13th St. S. W., Akron, Ohio 44314.
Wapwallopen, Penna.: May 28-29, Bench Rest Rifle and Heavy Varmint. July 2-3, **SPEER MATCH**, Bench Rest Rifle and Heavy Varmint. Sept. 17-18, Bench Rest Rifle—Eastern Region Championship. Council Cup Rifle Range, Robert W. Hart, 332 Montgomery St., Nescopeck, Pa. 18635.
Canton, Ohio: June 4 and Aug. 13, 1 P. M. Saturday, Heavy Varmint only. Canton-McKinley Rifle Club, c/o R. H. Johnson, 3118 11th St. S. W., Canton, Ohio 44710.
Fassett, Penna.: June 11-12, July 9-10, Sept. 24-25 (Eastern Region Championship). All matches for Heavy Varmint, Light Varmint and Sporter. South Creek Rod & Gun Club, c/o Gerald Arnold, R. D. #2, Gillett, Pa. 16925.
Johnstown, New York: June 18-19, Bench Rest Rifle, Heavy Varmint and Sporter. Pine Tree Rifle Club, Inc., c/o Edward J. Sweeney, 501 North Market St., Johnstown, N. Y. 12095.
Midland, Texas: Heavy Varmint, Light Varmint and Sporter National Championships, Sept. 3-4-5.

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MISSISSIPPI VALLEY REGION

St. Louis, Missouri: April 23, Unrestricted bench rest rifle 4 P. M.—24, Heavy Varmint 10 A. M. May 14, Heavy Varmint 5 P. M.—15, Light Varmint and Sporter 10 A. M. May 29, Hunting Rifle 11 A. M. Mississippi Valley Regional Championships; June 11, Unrestricted bench rest rifle 9 A. M., Light Varmint 4 P. M.—12th Heavy Varmint 9 A. M,. Sporter 2 P. M. July 23, Unrestricted bench rest rifle 4 P. M.—24th, Light Varmint and Sporter 10 A. M. August 13, Heavy Varmint 5 P. M.—14th, Light Varmint and Sporter 10 A. M. Bench Rest Rifle Club of St. Louis, H. J. Vandiver, Sec'y, 12121 Rosedon, Bridgeton, Missouri 63042.

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Hunters spend about $1.5 billion a year; most of it for travel, food, clothing and gear.

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There are more than 40 million gun owners in the United States.

For decades, the shooting industry has supported legislation aimed at the criminal misuse of firearms. It has also urged stronger enforcement of the laws already on the books.

BLIZZARD BOUND BENCHRESTERS

Dear Phil:

At the moment it is a fairly even bet that the Eastern Region winter meeting will be moved to Miami. The meeting was scheduled (and held) in Rochester, N. Y., Sat., Jan. 29 and Sun., Jan. 30. Snow started on Friday night, the 28th, and that so-called beautiful white stuff descended in clouds, in tons and continuously until today, Tuesday, Feb. 1st. At the moment there is four feet on the ground and any resident of a snow belt knows what 40 mile winds will do to it. In case some of our western members, such as C. C. Hankins, Les Bowman or Ray Speer are inclined to sneer at we effete easterners I can report that yesterday, two men were dug out of a 12 foot snow bank a half a block from the Hotel. One was dead, the other had only a polite snootfull—which speaks highly of the benefits of good nourishing booze.

Today, four days after the onset, the city is still snow bound, with no transportation, rail, air or auto, beyond the city limits. Six inches or more is promised for tomorrow! We who are socked in are contemplating a trip to Beneficial Finance. And for once we are almost bull-sessioned out.

In spite of the annoyance of being unable to get home we have really enjoyed ourselves, gotten to know one another better and have had an experience we will always member as a pleasurable one.

Stranded in Rochester are John Collins, Irv and Mrs. Potter, John and Mrs. Kohler, Paul Gottschall, Bob and Hazel Hart, "Hap" Zeiser, Bill and Inez Purcell, "Mickey" (Mrs. Clyde) Hart, Olive Walker and daughter. Brunon Boroszewski, Sig Gufca and the Streeters got under the wire on Sunday to Buffalo, just missing a 100 car pile-up which closed the roads. Clyde Hart, with Doc Garcelon, Art Freund and Mike Walker just made it back to LaFayette, with Mike stranded there. No report on George Kelbly who may well be digging out of a snow bank around Erie, Pa. John Collins, who lives on the outskirts of Rochester, cannot get home until the outlying streets are cleared.

Lest this rather light report discourage future attendance it should be pointed out that had this meeting been held in Harrisburg, Pa., as is planned for next year, most of us would have long since been home. It should also be emphasized that this is the worst storm Rochester has had within the memory of man. Had it fallen on New York City it would have been acclaimed as far exceeding the famous blizzard of '88.

We will not report on the results of a fine, productive meeitng, leaving that to the officers, but can say that an excellent program of matches for the coming year was set up and hope to meet an ever growing number of competitors there.

We all missed Crawf Hollidge who was absent for the first time from an Eastern Region meeting. Crawf had the misfortune to have the chamber of a 12 gauge shotgun burst, severing the main artery in his right arm. Fortunately the bone and nerves were not seriously damaged and Crawf reports that he is well on the way to recovery. We send our best wishes that it will be speedy and complete.

Cordially,

John Collins
Bill Purcell

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DEGREASING BULLET CORES

By Graham W. Bostick

The method of cleaning cores which I have successfully been using for some time is one that follows the general principles of cleaning or degreasing small parts that most industries use. I use trichloroethylene in three stages or bath method.

Trichloroethylene is an excellent degreasing fluid, is cheap and is readily available. It can be bought by the gallon from most chemical supply houses or from the industries that use it. Trich. is not as toxic as carbon tet.; however, certain safety precautions should be used. They are: Don't breath it in any large quantity or you will get a cheap drunk. Breathing it over a period of years will cause cirrhosis of the liver; however, the health hazard isn't anything to be concerned with, being that most fellows will use it rather infrequently. Keep it off the skin and have good ventilation.

I have three-quart containers half full of trich. and a container to hold the cores This container is a sieve used in making tea in the kitchen. Actually any type of sieve will do as long as it is steel.

The first container is the basic cut which I submerge the cores in to cut off most of the Hoppe's; the second cleans more off and the third is the final cleaning. The reason for three separate cleanings is that the oil coming off the cores won't contaminate any one jar entirely and the last will be practically 100% pure trichloroethylene.

I leave the cores submerged in each jar about ten minutes during which I raise and lower the sieve about two or three times every five minutes to get a cleaning action by the fluid flowing over the cores. You will notice that the cores do not move and therefore are not bruised.

I keep the jars covered at all times and do not heat the fluid.

After the last bath, I pour the cores out on a clean towel whereby they quickly dry.

Next comes the icing on the cake. This is a method of final cleaning that can be used with the above method or any other method that anyone is presently using.

I use denatured alcohol to completely cut off any film that may be left on as a result of cleaning by soap or chemical. I am not sure that the other methods don't leave a film and denatured alcohol leaves no film at all.

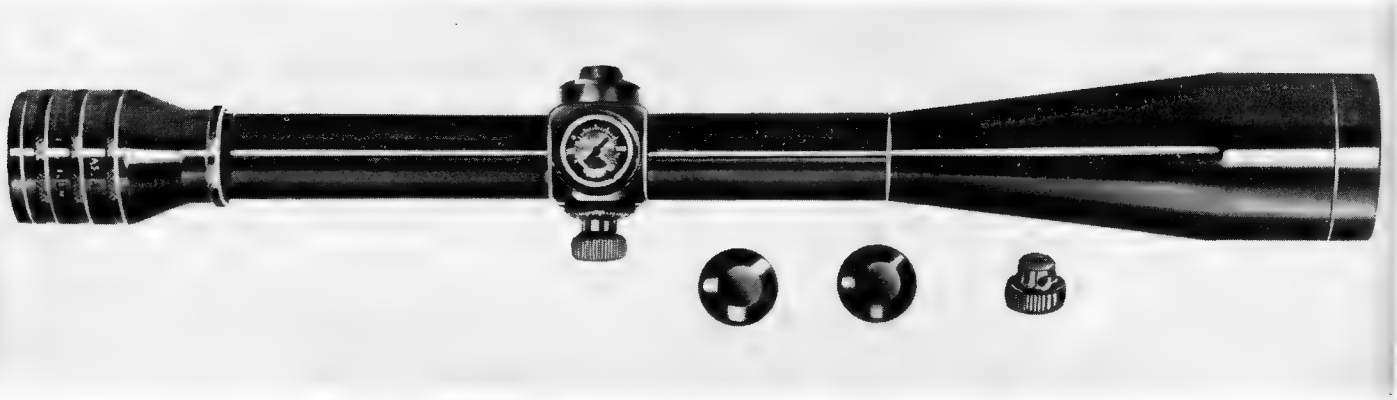
I leave the cores in this bath for ten minutes, agitate the fluid and remove them. After drying on a towel, they are ready to insert. The cores are bright and shiny and have no caustic-residue appearance. This will give perfect lead to copper contact.

One of the problems the engineers have with missles and rockets is the "welding" of the contacts and parts by molecular exchange of the metal surfaces. These parts being extremely clean and having perfect surface to surface contact actually weld together. This is what we shooters are trying to obtain—a welding of the core and the jacket—and this can only be obtained by extreme cleanliness with no film or residue on the core or inside of the jacket.

• • •

"Certainly one of the chief guarantees of Freedom under any government, no matter how popular and respected, is the right of the citizen to keep and bear arms. This is not to say that firearms should not be very carefully used, and that definite safety rules of precaution should not be taught and enforced. But the right of the citizen to bear arms is just one more guarantee against arbitrary government, one more safeguard against a tyranny which now appears remote in America, but which historically has proved to be always possible."—Senator Hubert H. Humphrey (Minnesota, Feb., 1960)

It is a federal offense to use the U. S. mail for shipment of pistols, revolvers or other concealable guns.



The new Redfield 12X target and varmint scope with unusual new features.

NEW PRODUCTS FOR 1966

When the Redfield Gun Sight Co. announces a new product is is usually NEW in the field, not just someone else's idea newly added to the Redfield line. Such is the case with the Master 12X Scope for Varmint, target and bench rest shooters which will be available this year.

The big new feature of this Master 12X scope is the parallax adjustment method. All scope sights of over 6X magnification require some means for ready adjustment for parallax. The conventional method has been an adjustable objective bell ring which is screwed in or out to provide parallax free sighting at the varying ranges. For this new Master 12X scope the Redfield engineers have designed a precise system utilizing an internal lens which is controlled by a "third turret" on the left side of the scope tube.

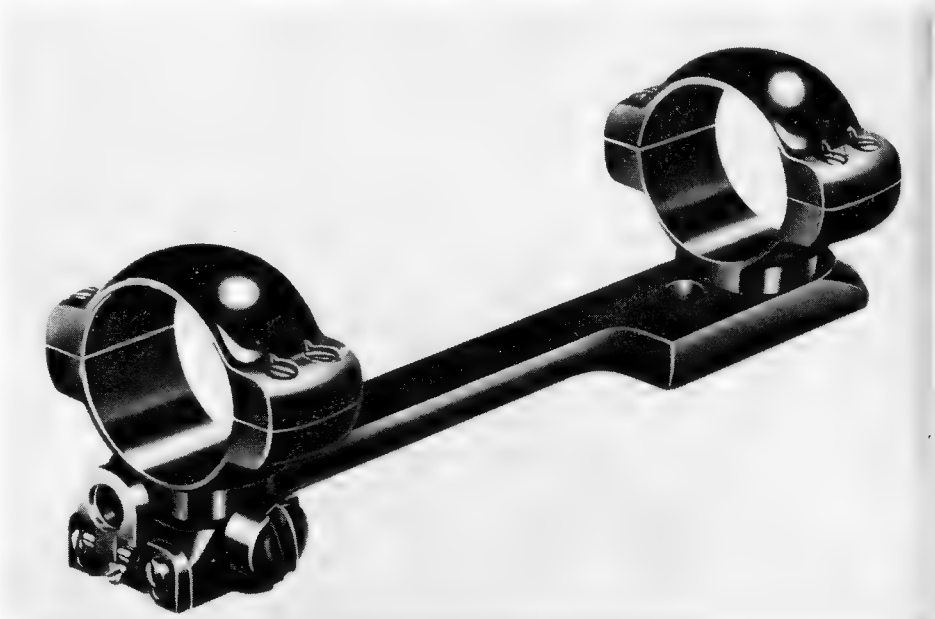
Elevation and windage adjustments are of the usual precise Redfield design, but with the new feature of one quarter minute of angle "click" control. Elevation and windage controls may be coin operated in the conventional manner but, in addition, detachable knobs are provided which permit making sight adjustments "by feel" while in shooting position. The parallax adjustment is convenient and positive. All turrets are completely sealed against moisture, even with the caps removed.

This new scope interests me very much and I hope to have the opportunity to see and use one as soon as they are readily available. They probably won't be on all dealers' shelves until summer.

Redfield also announces some new models and improvements of others in their line of metallic sights, both hunting and target.

New, riflewise, from Winchester is a moderate priced auto-loading 22 rimfire plinking rifle which handles short, long and long rifle without adjustment, even when the various lengths are mixed in the tubular magazine. Ability to handle this mixed diet will probably have sales appeal to many purchasers but, personally, I wouldn't consider it of much practical desirability.

Savage Arms will now provide the Model 110 bolt action rifle with a detachable box magazine as an optional feature,



New Redfield Jr. scope mount with integral folding peep sight on rear of base.

New Winchester Model 190 auto loading .22 rim fire rifle which handles shorts, longs and long rifle cartridges without adjustments—cartridges may be mixed. A moderate cost plinking rifle which looks neat.

as they did with the Model 99 lever action last year. They will now offer their little over-under rifle and shotgun with a 222 Remington cartridge rifle barrel over the 20 gauge shotgun. Seems like the very capable boy is growing up to man-size. (Redfiled has a receiver sight and a rib base for mounting their long eye relief Front-IER scope ready and waiting to go on the Savage M24V over-under.)

Colt is announcing a "STAGECOACH" model auto loading 22 rim fire rifle of plinking type with 1866 "looks" and 1966 mechanism. The rifle (carbine) has a 16½ inch long barrel and is only 33¼ inches long overall and has a tubular magazine.

Milton Drynin, Box 162—Fleetwood Station, Mt. Vernon, N. Y. 10552 is marketing some neat cartridge box information labels for handloaders. Labels are 2" x 3" printed with information headings on glossy stock with peel-off backing pressure-sensitive to adhere to containers of any material. Information may be typed or written with ball-point pen. Size of labels and arrangement of information headings is somewhat similar to the labels supplied by some of the bullet manufacturers, but are neater and more convenient to use. Labels come in rolls of 500. At a penny a label it seems more sensible to use a new label when changing a load than to erase and change information on the "free" labels. Write to the manufacturer for more complete information.

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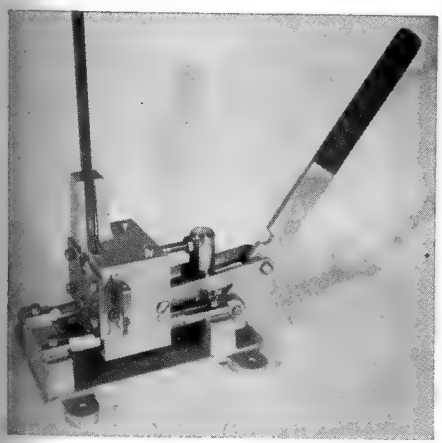

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COMMENT

Barrel Vibration & Behavior

By G. W. P. Swenson

I see that Mr. Grigg has tackled the November Barrel Vibrations article in his usual thorough manner and that he is sticking with the original Proude theory of "fishing rod" flip. However, even when the theory was first promulgated there was considerable doubt whether this was the sole source of bullet deflection.

Martin & Muir's ("Vibrations of a Rifle Barrel," Journal Royal Technical College, January 1938) attacked this problem somewhat differently. They considered the rifle as a bar with both ends free and somewhat damped at one end. They then divided flip into three categories.

1) Calculated as a rigid body allowing for recoil and angular velocities of the rifle, and the angle through which the rifle is rotated before the bullet leaves the muzzle.

2) Fishing rod flip.

3) Transverse Vibrations.

As pointed out by Mr. Grigg these vibrations would have to be of a high frequency to beat the bullet out the muzzle. These transverse vibrations are caused by striker fall and the explosion of a cartridge. As they state "the explosion in the breech of the rifle and the reflection of stress from the free butt end sets the butt end of the barrel into very erratic vibrations. The pulse of strain which is sent along the barrel begins to reach the muzzle in two or three ten-thousandths of a second and gives the muzzle a downward fishing rod flip long before the bullet is there. The muzzle is then set into vibration with all the resonant frequencies possible to the barrel one after the other, higher harmonic before lower, and with no other frequencies of appreciable amplitude. The deviation of the bullet is due to the angular displacement and the vertical velocity of the muzzle at the instant when the bullet leaves."

Incidentally Martin & Muir checked their oscilleograph readings with actual shooting.

It would appear, however, that with the Springfield rifle Capt. Quayle miscalculated the point of exit, as it has been shown by Crossman in "The Book of the Springfield" (pages 126-128) that when this rifle (in this velocity range) fires, the bullet leaves the muzzle on a downward swing.

As Mr. Audette pointed out there is also a horizontal component in these transverse vibrations, and it is an interesting test of rifle consistency to fire rounds of various velocities at a distance of 25 to 50 yards after the rifle has been bore sighted, and plot the results.

As you can see it is the erratic transverse vibrations which cause most of the trouble. In addition to increasing barrel weight they can be decreased by the following methods.

1) Using a symmetrical action. The only one I know which is truly symmetrical is the famous B. S. A. 8 lug. Martin & Muir's experiments with a 3¼ lb. 30½ inch barrel show that transverse vibrations were practically eliminated.

2) Making the firing pin blow as light as possible. One of our most successful long range shots cuts coils off his firing pin spring until he gets a blow which is just safely sufficient to fire the primer. Since he is an explosives chemist he should know the answer.

3) Hanging a weight on the muzzle. This is done as a matter of course when using optical sights.

4) Cutting steps in the barrel. This seems to be a feasible method, but causes metal fouling.

5) Changing barrel contour, as in the Remington Model 30.

While not perhaps affecting the transverse vibrations as much, another method is to change barrel length if the point of exit is near to a favourable position.

As a small bore shooter Mr. Grigg may be interested in the results of series of experiments carried out to test the factors leading to accuracy in .22 Match ammunition. An experiment was set up at 50 and 100 yards with a .22 heavy barrel rifle of proven accuracy. Velocity and angular displacement of the muzzle were recorded for each shot, together with the location of the bullet in its group. Velocity did not seem to be an important factor as long as kept within the limits of Match rifle ammunition, but transverse vibrations, particularly those caused by striker fall, were definitely a factor mainly because they varied from shot to shot.

In regard to Col. Wright's comments on rifling twist, the only thorough research on the subject that is available to me is that conducted by the Match Rifle Experimental Committee of the N. R. A. (England) when they developed the 174 grain boat-tail bullet which became the 303 Mark VIII. The final development of the bullet came in 1930 when it was fired at a velocity of 2850 f. s. from a barrel with 12 inch twist. At 1,100 yards about 10% of the shots were "tippers," 80% of these had a tip of 10 degrees, the remainder about 15 degrees excepting one shot with a tip of 20 degrees. The bullet did not tip at 800 yards but tipped materially when the range was 1,100 yards. In some barrels the tip at 1,100 yards was slight and negligible and in others quite abnormal. The cause of the tipping appeared to be clear. At 800 yards the remaining velocity was 1600 f. s. and time of flight 1.1 seconds, the rate of diminution of spin is placed at 5 and 10% per second. At 10% rate at 800 yards the spin of the bullet is thus reduced 11%. This means that the bullet at 800 yards is the same as a bullet would be near the muzzle if fired at a

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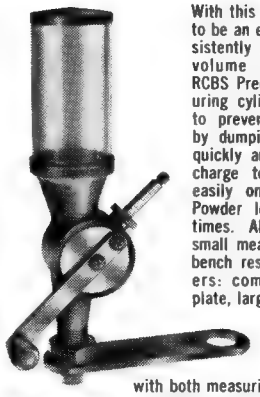

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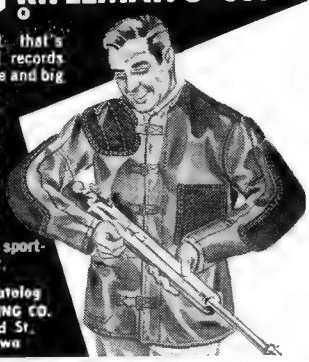

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muzzle velocity of 1600 f. s. in a barrel having a twist of one turn in 7.6 inches. At 1,100 yards remaining velocity is 1260 f. s. corresponding to a muzzle velocity of 1260 f. s. in a barrel having a twist of one turn in 6.0 inches. Clearly the bullet in the air at 800 yards was over spun, and it was possible that an overspun bullet would begin to tip if it was not symmetrical about the axis of revolution. In 1931 the experiments were repeated when the tipping was observed to be about 15%. With a muzzle velocity of 2600 f. s. only 4% slight tips were recorded. This ammunition is generally conceded to be the finest ever produced in this country (England) for long range shooting, and the Field of July 16th, 1932 in reporting the Bisley Meeting, said "it is doubtful if ever before has such accuracy been obtained by any other combination by any other barrel or ammunition as was obtained in the Match Rifle events this year."

It would seem from reading Precision Shooting that if as much ingenuity was applied to embodying what is known to increase accuracy, as is used in evading the restrictions, there would by now be a Hunter class of rifles producing accuracy, nearly as good, if not as good, as the present monstrosities.

• • •

For centuries, the Swiss Constitution has provided that every mature male be issued a gun by the army reserve. Even though these guns are kept at home, Switzerland has virtually no armed crime.

The National Shooting Sports Foundation has distributed more than 65 million leaflets on "The Ten Commandments of Shooting Safety."

BULLET BEHAVIOR

By Jesse M. Grigg

To comprehend the answers to Paul Wright's questions (October Precision Shooting) one does not need to understand mathematics. It is necessary only to be familiar with several of the principles of mechanics that are involved in a qualitative discussion of the bullet's flight.

First of all suppose that a top is spinning steadily with its axis of rotation perpendicular to the plane on which it rests. If now a side thrust be imparted, as for example with a camel's hair brush, the axis declines, but not in the direction of the thrust. Instead it declines at right angle to the thrust, and the angle of declinaiton imparted becomes the angle of declination at which the top then proceeds to precess or "yaw," these terms meaning ot swing in circles about the axis which contains the point or spike. The direction of rotation in precession is the same as the direction of spin. The angle of declination in precession corresponds to what in the case of a bullet is called "tip."

Meanwhile the act of precession or yawing exerts a torque tending to straighten up the axis of tip. If the spin rate were just right for the angle of tip it would just succeed in so doing; if the spin rate is too fast, i. e. if the top is overstabilized, it will even cause oscillation in and out of the vertical before the top finally goes to "sleep." In the case of a bullet the oscillation of the nose or base in and out of the trajectory tangent is called "wabbling," and precession about the trajectory tangent is familiarly known as "yaw," as above mentioned.

Another principle is established by considering what will happen if the rope breaks while a pail of water is being swung in a circle with the rope attached to the bail. Obviously the pail takes off in the direction of the tangent. A similar circumstance too often obtains when a bullet in the bore has a center of form which does not coincide with its center of gravity; namely, the bullet is out of balance. Accordingly, as the bullet leaves the muzzle there is imparted a sidewise push which obviously does not help the accuracy. Nor is this all. The bullet gets a tip at either its nose or base, and therefor is started to yawing and perhaps to wabbling in motions similar to those ascribed to the top.

Another principle is that a bullet in air tends to follow its nose; or, more accurately stated, tends to move parallel with the momentary direction of its axis. This is easily believed for the case of an arrow shot into water; but in the case of a bullet, because the air is so thin, the effect is more of a tendency than a fact. Nevertheless, over a considerable range, the accumulated effect of even a tendency may be heartbreaking in effect on accuracy.

Finally, what is more a result than a principle, is established in what follows. When a bullet leaves the muzzle with sufficient spin to stabilize it, it would in the absence of gravitation move with its long axis always parallel with the axis of the bore. However, owing to the attraction of gravity, the trajectory becomes more and more curved. In a vacuum the bullet would still move with its long axis parallel with the bore. But in air, with the trajectory curving under gravitation, the bullet can only try to maintain its axis parallel with the bore. Thus there is an upthrust of wind pressure under the bullet nose which tends to lift the nose. This tendency, in combination with the principles of the gyrostat is what brings about the so-called "drift."

With the principles already established it is now very easy to account for this so-called "drift." As regards definition this term is properly applied only to the sidewise translation of a projectile that is rotating in air with its nose inclined upward from the tangent of a trajectory that is curved in the plane of fire due to the attraction of gravity. The word drift is improperly used if applied to deflection that is caused by wind. The carrying aside due to wind is properly called "deflection."

Suppose now that no wind is blowing, yet there is an upward thrust of air pressure under the nose owing to fact that the trajectory is curved in the plane of fire. According to the principles established for the top the bullet nose will move sidewise instead of upward. For right-hand twist the direction is to right, for left-hand to left. So, as the bullet tends to follow its nose, the trajectory gradually curves to the side indicated by the direction of twist. This deviation, nominally independent of wind, occurs even in a dead calm. For the old .30 '06, 150 gr. the drift proper was 12.74" at 1,000 yards and 148.24" at 2,000 yards.

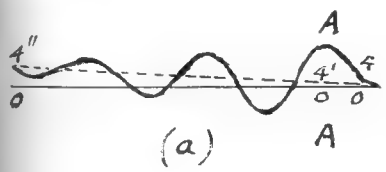
The reported cases of smaller groups at longer than at shorter ranges are not so easily disposed of in the matter of explanation. However, where there is smoke there is fire. Beside the claim of Mr. Wright's informant, Creighton Audette some years ago reported such a case, either in Precision Shooting or in its predecessor. I no longer have access to such details as distances, caliber, and group sizes as most of my saved periodicals of that period were destroyed by flood. Nevertheless, the above-stated principles together with the findings of Dr. Mann are clues to an explanation of these reported freaks of bullet behavior.

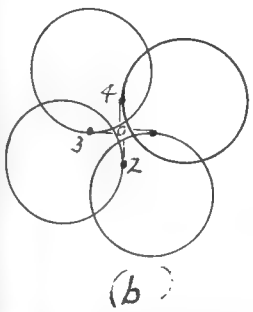
To begin with it has already been stated that a bullet out of balance flies off at a tangent as it leaves the muzzle. In general this imparts a tip to the nose. The spitzer bullet with its long slender point lighter than its base perhaps is tipped more than is a blunt-nosed bullet. At any rate tipping causes the bullet to

yaw, or weave its point in circles about the mean trajectory. Also, if overstabilized, i. e. having too much spin, it will oscillate in its angle of tip, which phenomenon is called wabbling. However, wabbling has nothing to do with the behavior about to be described, and moreover perhaps would prevent the occurrence of the freak of smaller groups at greater distance. So it is assumed that the tipped bullet is merely yawing or weaving about the trajectory.

This yawing leads to another kind of motion owing to fact that a bullet tends to follow its point. With the point tipped away from the trajectory axis and also moving in circles about that axis the bullet travels forward in a small spiral about its mean trajectory. By screen shooting Dr. Mann demonstrated this over and over.

Now let it be supposed that, as is quite possible, the bullets in some particular lot are slightly out of balance, though with machine production all are out of balance in about the same degree. When they reach the chamber, however, being inserted at random, the similarly biased sides will be positioned at various different angles of the clock. Thus a projection of the respective spirals in which they will move in flight may be represented in the manner that is shown in the accompanying sketches.



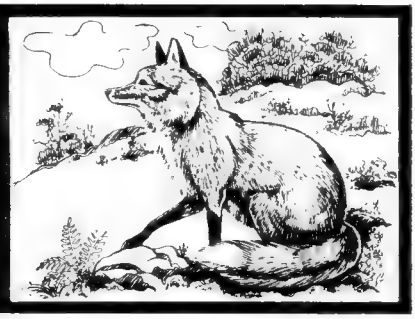


Sketch (b) is shown for four rounds assumed to have been loaded with their respective biased sides spaced at 90° around the clock. It is proper to draw each circle to the same diameter because the bullets equally unbalanced will move in spirals whose complete turns are repeated in about equal distances in their respective trajectories.

For clarity both sketches are greatly exaggerated and also are not to scale. Sketch (a) refers to one particular round in (b), i. e. the one whose spiral starts with 0-4, and it denotes the projection of this spiral on the plane of fire. Similar projections, rotated in order through 90°, 180°, and 270°, might be drawn for the

Turn to page 18

Extra Weight for Extra Range with HORNADY Varmint Bullets



When the Tortoise overtook the Hare, he proved that fast starters don't always finish first. We prove the same point in the comparisons below. Heavier Hornady varmint bullets—like the Tortoise—may start slower, but don't lose zip as quickly as lighter ones.

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VELOCITY AND ENERGY TABLE

	Muzzle		200 Yards		400 Yards	
222 Remington	fps	ft. lbs.	fps	ft. lbs.	fps	ft. lbs.
50 gr.	3200	1137	2380	629	1725	330
60 gr.	3000	1199	2310	711	1740	403
243 Winchester						
70 gr.	3500	1904	2675	1112	1975	606
87 gr.	3200	1978	2620	1326	2120	868
30-06 Springfield						
110 gr.	3400	2824	2590	1638	1920	900
130 gr.	3300	3144	2590	1936	1980	1131

Bullets for Handloading *Send for list.*

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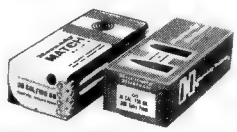

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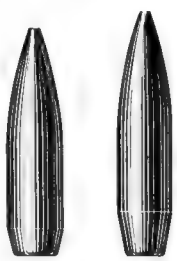
Mr. Clerke won the National Bolt Rifle Championship at the 1965 National Matches with a new Civilian Record of 793 out of a possible 800 with 91Vs. This is an aggregate of scores fired in these 7 matches: President's Match, Coast Artillery Trophy Match, Scott Trophy Match, Air Force Cup Match, Navy Cup Match, Nevada Trophy Match, and Crowell Trophy Match. He won the trophy in the Crowell Match.



J. A. Clerke used Sierra's 30 caliber 168 grain International for short ranges and the 30 caliber 190 grain Matchking for the 600 and 1000 yd. matches. These are but 2 of 54 perfect shooting Sierra Bullets available at your dealers for target and game.

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this case rather accurately lined up with the final outcome, with some exceptions—such as Meger, who got off to a slow start prone. Adams had trouble Standing, but was so strong in the other positions that it didn't hurt him too badly.

LT. **Margaret Thompson**, who won the Navy Cup at Perry last summer, is developing into a really great shooter. Her progress has been so solid since reporting to USA MTU only a few months ago that she can hold her own with the best of them, as evidenced by the scores above. She fired 391 prone, 372 kneeling, and 344 standing. She does not have to demonstrate for equality, gentlemen. She has earned it!

The **International Shooting Union Team Fund Aggregate,** a total of the prone and standing, went to Wigger's 759, Dingman—750, Krilling—747.

February 4th, the second day, was devoted to the Int'l 4-man team matches, over the half course . . . Ft. Benning Team #3 was the winner with 2195. Team members: Wigger—559, Dingman—549, Bruce Meredith—544, Ross—543 . . . Ft. Benning #2 team was also 2nd place team with 2186, composed of Krilling—544, Adams—551, Kimes—540, Meger—551 . . . For the impressive Expert Class plaque, the USMCR Crimson Team of Hinkle, Ken Hayes, Hood, and Allen, defeated the Florida State Association, 1927 to 1913. The large plaque has been forwarded to General Wallace M. Greene, Jr., U. S. Marine Corps Commandant.

***

Famous names dotted the firing line in profusion on February 5th as 66 Masters—36 civilian and 30 military—entered the Sawgrass Prone tournament. From 18 states they came, a most representative cross-section of shooters.

Already warmed up and acclimated to the cold, Wigger took the 50-yd. metallic with a 400-37X over Bill Schweitzer's 400-30X . . . Separate awards were presented to military and civilian winners, but for the purposes of comparison and viewing the complete picture, let us check the overall results . . . A 398-27X by Dave Boyd won the 50-meter as scores were really unbelievably low and some shooters dropped more than they sometimes drop all year. Wigger was second with 397-27X and veteran wind-doper, Schweitzer, had 397-25X, as master class scores dipped down to 379 . . Mike Allen came through with a 399-25X Dewar win as Joe Steffey and Marty Washington's 398-26X's were next best . . . When Herb Hollister has a bad match, watch for him to bear down meaningfully, as in the 100-yd., which he won with the only possible, X-count 28. Boyd's 399-20X followed, and troubles were experienced generally up and down the line.

Sharing the wealth in the **Metallic Aggregate** were: . .

Wigger, with the lion's share—1590-101X, and Marines who landed the service spots—

Boyd	1589- 87X
Allen	1589- 80X
Briggs	1588-100X
Krilling—USA-ATU	1586- 90X
Civilians:	
Martin Washington, Miami	1585- 98X
Steffey, Paris, Ill.	1585- 90X
Schweitzer, Palm Beach	1582-102X
Claude Hanes, Tampa	1581- 89X
Dr. F. P. Archer	1581- 86X

Aggregate award to the High Senior went to John Laraia, of Worcester, Mass., for a 1574-76X. He won the senior award in the meter and Dewar; Art Strebe, at 50-yds.; and Chris Westergaard, at 100-yds. . . Isn't it wonderful that they provide special awards to senior shooters? We would like to see more clubs follow suit. Let's give them a chance to win something after their eyes become weary . . . At least a couple of those over 55, whose eyes are still young, gracefully bowed out of the special category.

* * *

Human Interest Dept.—Passing out cigars (figuratively, at least) was Marty Washington, who became a father while shooting the metallic matches. You've heard of nerves of steel.

Breaking in his new leather jacket, Joe Steffey seemed to be agonizing throughout the first day. By the second day, it was sufficiently broken in for him to appear to be "feeling no pain." He shot that way, too. (Well, we mean.)

Everyone was happy to welcome **Doc Archer** back on the firing line after his illness. He has been the genial host at many tournaments on his Homestead, Florida, range.

* * *

What a contrast! Forty-three possibles at 50-yds. any, with the emergence of the Chamber of Commerce weather. Wigger started off purposefully, only wasting 1X. His 400-39X led Krilling and Steffey's 400-37's, Sundstrom, Archer, and Briggs' 400-36X's . . . Bill Krilling's 400-35X Creedmoored Steffey at 50-meters. Mike Allen and Hollister turned in 33X's, and, with 32X's—our inimitable friend, Al Freeland, Marty Washington (how does he do it?), and Doc Archer . . . Herb Hollister, well on his way to a 1600, topped the Dewar with 400-37X, as Dr. Archer placed second with 400-34X. Bruce Meredith, former All-American rifleman at West Virginia, was Hi Service and 3rd place, scoring 400-32X . . . Dennis Dingman's 400-31X led Wigger and Joe Steffey by an X . . . Krilling lost his 1600 . . Mike Allen dropped a point which cost him the Grand Aggregate. "So close and yet so far away."

Herb Hollister was the heavy holder for the day. His 1600-131X surely served to erase a measure of the anguish caused by the 50-meter iron. **Joe Steffey** was precisely a point behind, which he lost in the Dewar. His 1599-131X was good for 2nd place. Other **Any Sight Agg.** winners:

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3rd place—Krilling	1599-129X
4th place—G. Murdock, USMC	1599-106X
2nd Civilian—Al Freeland	1598-123X
3rd Service—Allen	1598-120X
3rd Civilian—Schweitzer	1598-118X
4th Civilian—M. Washington	1598-111X
High Senior—John Laraia	1593-123X

Again Laraia claimed the Senior award in two of the individual matches. C. H. (Bob) Kline, of Lock Haven, Pa., took it with a 400-25X in the Dewar, and W. Tufts of Westboro, Mass., had 400-25X at 100-yds.

In the 50-yd. aggregate, it was Wigger over Schweitzer, 800-73X to 800-64X . . . Veteran Dewar Team member, Mike Allen, took the Dewar Aggregate—798-54X to Bruce Meredith's 798-53X.

Long popular for its merchandise awards, the Sawgrass tournament also has a unique method of advertising. The Sawgrass sweat shirts, appropriately orange in color, couldn't be overlooked at the Pacific States Fall Round-Up, for example . . .

Sawgrass Champ **Lones Wigger** loaded up his station wagon with loot to travel on to Hollywood (the one in Florida) . . . and runner-up **Mike Allen** resembled a souvenir-collecting tourist when he got off the plane with his winnings. Mike was a member of the famous Brea (Calif.) Juniors, champions all. He was a member of the 1963 NRA International Prone Team . . . Sometimes I think that it is easier to shoot a 10X than to get Mike to discuss his shooting achievements. What theories that he has, he considers not worth passing on. But, some day, I'll catch him off guard . . . Always fair, he challenged his score on one occasion, because he was given a point which he didn't have. It cost him a national reserve record! But, he could sleep that night . . . He views his fellow-competitors through rose-colored glasses—they are all great . . . For shooting (metallics), he uses the single-lens, Walter Gehmann shooting glasses, adjustable for angle and position. His prone rifle is a 52C with Douglas stainless barrel, in which he used Mark III . . . He has his new Anschutz in a beautiful custom position stock, but it takes some getting used to.

Sawgrass Prone Championship—

Winnner—Lones W. Wigger, Jr.	3187-228X
1st Ser. Master—Mike Allen	3187-200X
2nd Ser. Master—Bill Krilling	3185-219X
1st Civ. Master—Joe Steffey	3184-221X
2nd Civ. Master—Marty Washington	3183-207X
3rd Ser. Master—Frank Briggs	3181-213X
3rd Civ. Master—Bill Schweitzer	3180-220X
4th Civ. Master—Herb Hollister	3179-229X
High Lady—Margaret Thompson	3171-187X
High Senior—John Laraia	3167-199X
High Junior—William McAllister, III	3157-169X

MORE POWDERS DISCONTINUED

DU PONT has recently announced that they are discontinuing; regular, single-base HI-SKOR shotshell and pistol powder and; P-5066 pistol powder. There will be no additional manufacture of either powder, and they will become unavailable when existing stocks are depleted.

They also announce that revised loading data is in preparation for release early this year. This data will reflect the continuing change in components available to the handloader and will include additional recommendations for the DU PONT powders, as well as new center-fire loading data. They will provide data for the double-base HI-SKOR 700-X powder in the pistol and revolver loads.

To secure the new data, see your DU PONT dealer or write to; Explosives Department, Cellulose Products, E. I. Du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware. (Please mention PRECISION SHOOTING when you inquire.)

• • •

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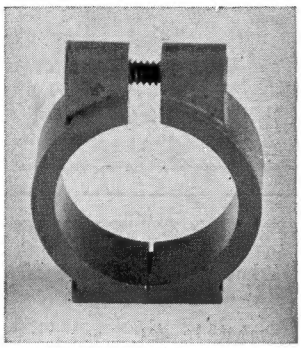

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The National Firearms Act, adopted in 1934, and the Federal Firearms Act, passed in 1938, are aimed at prohibiting possession of "gangster weapons," such as sawed-off shotguns, and the shipment of firearms into states that require licenses unless the receiver has obtained a license.

Bobwhite quail have an annual mortality rate of about 80% whether they are hunted or not.

remaining three rounds. Sketch (b) roughly denotes the first completed spirals of the four rounds projected on a plane normal to trajectory. The distance 0-4, tangent to a circle and greatly exaggerated, corresponds to 0-4 in (a), and it equals the sidewise or lateral deflection imparted by imbalance when the bullet left the muzzle. Being due to momentum, this distance increases steadily until it has become 0-4" in (a) where the spirals have been finally spun out by yaw.

If all the bullets were out of balance in exactly the same manner and degree, and emerged from the muzzle tipped at the same angle of the clock, the group size at 0-4" would be a mere point insofar as it depended on bullet imbalance. This point, however, would not coincide with the prolonged bore axis. For any intermediate distance beginning with the first spiral the potential group size would be diminishing with distance from the muzzle, depending on where in the trajectory the bullet were intercepted by the target. Thus if all four rounds were loaded with biased sides at the same angle of the clock this would be a case in which the group size would be smaller at greater than at lesser distance.

Moreover, a similar result is possible for the four rounds with biased sides distributed around the clock. For it is plain that the group size recorded depends on where in the spirals the bullets are intercepted. If they are intercepted at distances corresponding to the inside circumferences of the spirals (sketch b) the group will be of minimum size for that approximate distance; if intercepted at the outside circumference be a maximum size.

There is still another though more remote possibility for a group size to be smaller at greater than at nearer distance. It can happen if twice the distance 0-4" in sketch (a) is less than twice the height of the projection of the spiral above the axis 0-0 at any place in the trajectory.

In all three cases coincidence is the controlling factor. Further it seems to me that this freak of ballistics is most likely to be observed in the case of an understabilized bullet that is slow in spinning out its yaw. If the latter conclusion be correct, then it largely exempts the old 150 gr. .30 '06 service bullet which had the name of being decidedly wobbly near the muzzle but, as Dr. Mann found by screen shooting, settled down to point on at the end of the first 100 yards.

Finally, I want to compliment and thank Mr. Wright for having such an interesting curiosity about the freaks of ballistics.

• • •

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BUCKSHOT IN THE .30/06

By Fred W. Hallberg

To discuss the use of buckshot in a .30/06 in a journal devoted to precision shooting may be moving from the sublime to the ridiculous. Nevertheless, such a load can occasionally find a useful place in a rifle club.

Rifle clubs are a collection of human beings. Each is different. Not all will like the monotony and boredom of a never-deviating program of winter indoor shooting such as gallery position programs. Some shooters are born experimenters, some like to shoot the center-fire rifle on outdoor ranges, and some just support a club by constantly paying dues year after year and showing up only once or twice a year (with friends) to sight in a hunting rifle. Such people rarely show up on the indoor range.

If a club has a fair sized membership, acceptable indoor facilities, and only a few dyed-in-the-wool position shooters, it may be necessary to entice the deviates to a monthly meeting by organizing a social evening. Coffee and goodies play a part. Major interest may be centered on a well-chosen movie from commercial sources or on somebody's recent trip into the wilderness. Or if a club is large enough to make it attractive, a public speaker will be glad to come.

One gimmick that seems to have possibilities has just come to my attention and that is why I'd like to discuss buckshot loads. Most club members own .30/06 sporting rifles of some kind and many will take an opportunity to exercise them a bit. Buckshot loads can be the means of bringing such shooters out for at least one meeting of the winter season. Properly assembled, such loads can be made to group 10 shots in about two inches at 50 yards. That means they are accurate enough to serve the purpose on an indoor target at 50 feet. The slow-fire pistol target is excellent for such shooting and, of course, it will be from the standing position. Prizes are offered and everyone goes home feeling he has had a good time.

However, there are pitfalls that require restrictions. No shooter can be allowed to remove crimp and they must be chamfered ammunition must be furnished by the club and loaded by or under the direction of some one individual. Loading is not difficult but there is a proper way and a wrong way to do the job so as to obtain acceptable results.

Double "O" .33 caliber shot must be used. Cases should be sized with a .311 expanding plug. They must be trimmed to remove crimp and they must be chamfered more heavily on the inside, more lightly on the outside. During my tests I used up a quantity of corrosive primers and I found that with such primers 4 grains Bullseye produced best results. It may be that non-corrosive primers will work equally well with 3 grains Bullseye. Cartridges were assesmbled on an RCBS A2 press. No die was used to insert the bullet. The case was placed, as usual, in the cartridge holder and a buckshot rested on the case mouth. A flat piece of steel was then held under the opening that would usually be filled with the die and the case with the shot pushed up against it. In this way, the shot was forced into the mouth. At the same time the case trimmed a sort of doughnut off the equator of the shot and produced a slight cylindrical bearing surface. The inside chamfer caused the shot to bear heavily against the case thus preventing it from dropping down into the body. Inserting pressure on the ball creates a slight flat on its top surface. By pushing the ball into the neck so that the top is level with the mouth, sufficient space is left for lubricant. I found that heavy lubricants tend to stick to the ball and cause it to fly wild. A light lubricant, somewhat of the consistency of pump grease (slightly heavier than vaseline) seems to work well. My first trials, after rejecting standard bullet lubricants, were with boot grease but the brand I used had too much resin in it to work properly. However, the wide flat can in which it came was just right for the purpose.

It would be useful to hear how other clubs handle this problem of entertainment.

• • •

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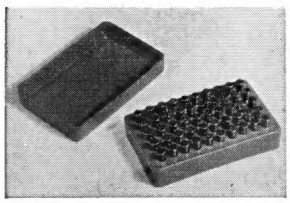

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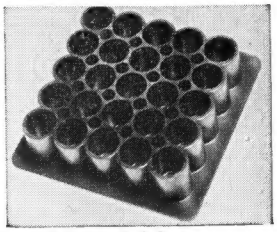

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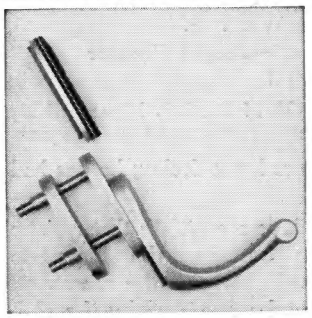

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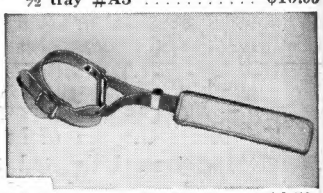

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